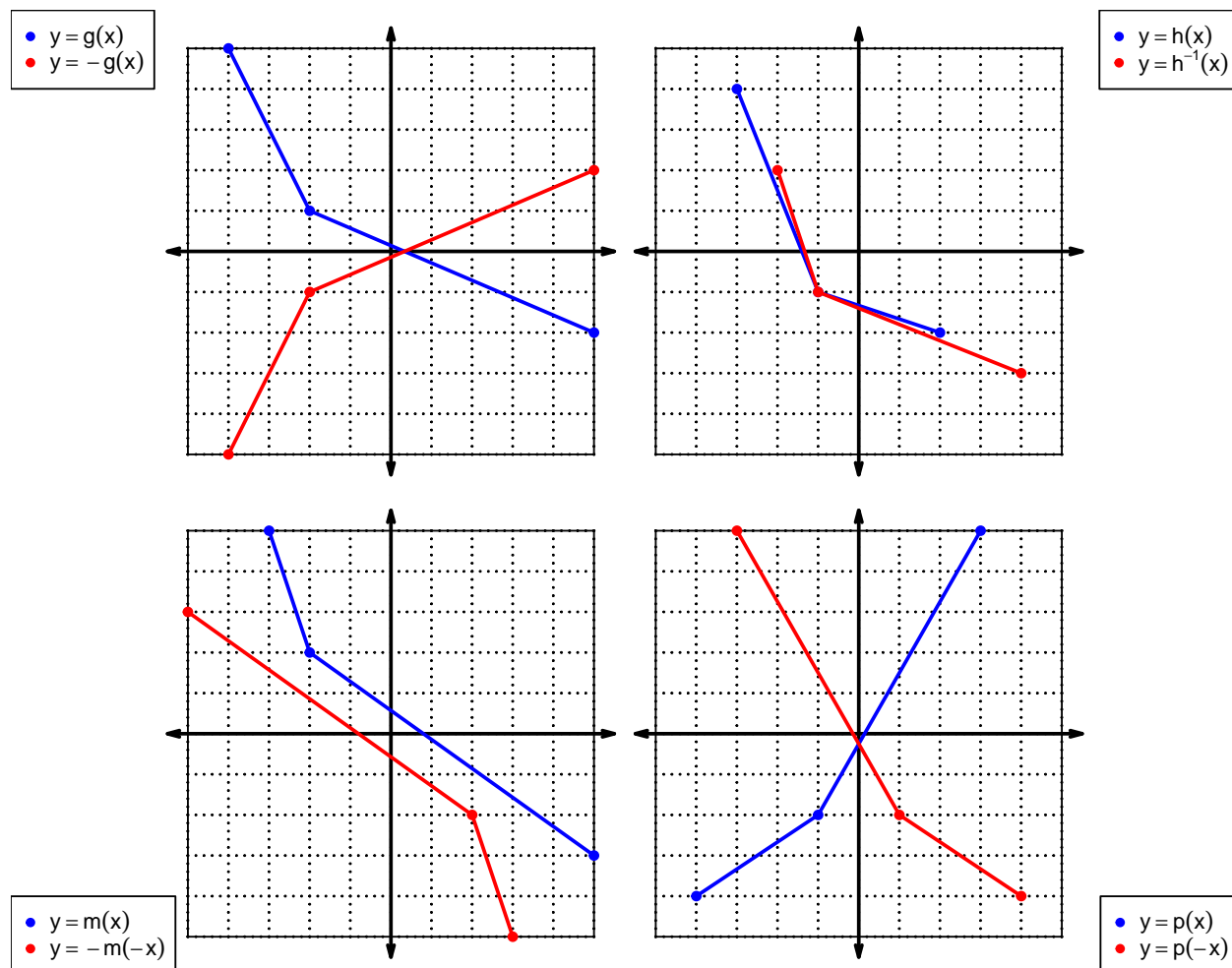# Exam: Function Reflections (Solution version 43)

1. Let function f be defined by the polynomial below:

$$f(x) \;=\; 9x^5 + 5x^4 - 6x^3 - 3x^2 - 2x + 7$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials

$-f(-x)$ •

$-f(x)$ •

$f(-x)$ •

• $-9x^5 - 5x^4 + 6x^3 + 3x^2 + 2x - 7$

• $-9x^5 + 5x^4 + 6x^3 - 3x^2 + 2x + 7$

• $9x^5 - 5x^4 - 6x^3 + 3x^2 - 2x - 7$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.

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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	1	6	7
2	7	9	1
3	2	1	5
4	8	3	6
5	4	8	2
6	5	7	8
7	3	4	4
8	9	2	3
9	6	5	9

3. Evaluate $h(8)$.

$$h(8) = 3$$

4. Evaluate $f^{-1}(5)$.

$$f^{-1}(5) = 6$$

5. By filling more rows of the table, it is possible to make function f **even**. If that were done, what would be the value of $f(-9)$?

If function f is even, then
$$f(-9) = 6$$

6. By filling more rows of the table, it is possible to make function g **odd**. If that were done, what would be the value of $g(-4)$?

If function g is odd, then
$$g(-4) = -3$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.

Let polynomial p be defined with the following equation:

$$p(x) \;=\; -x^3 - x$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) \;=\; -(-x)^3 - (-x)$$
$$p(-x) \;=\; x^3 + x$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) \;=\; -\left(x^3 + x\right)$$
$$-p(-x) \;=\; -x^3 - x$$
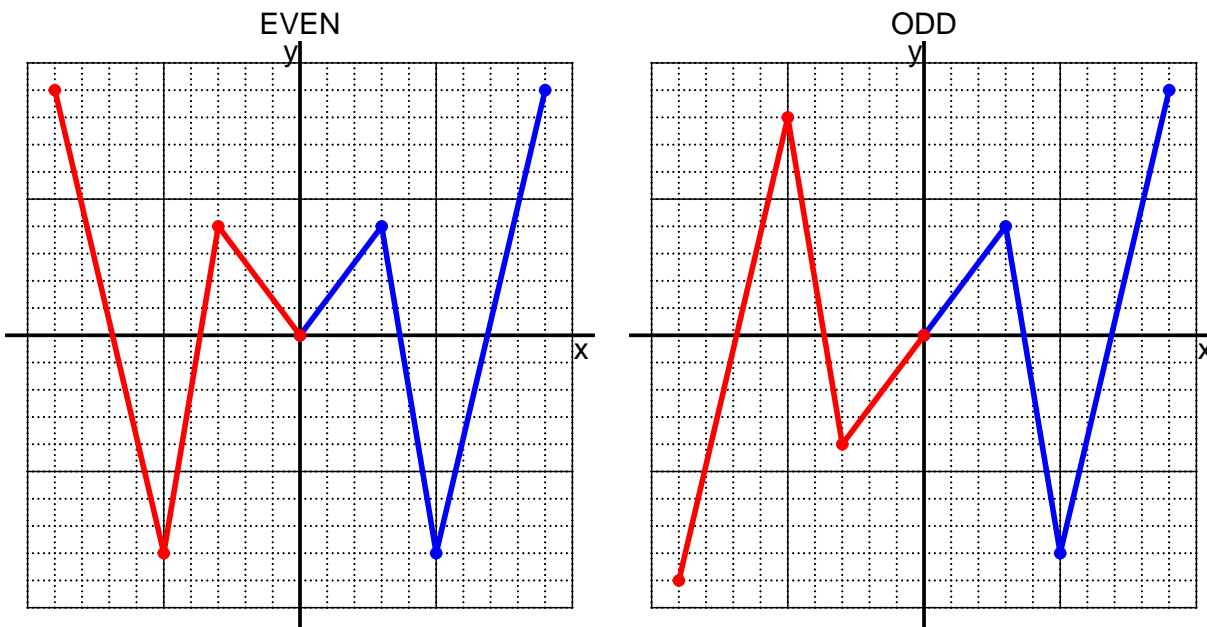
c. Is polynomial p even, odd, or neither?

odd

d. Explain how you know the answer to part c.

We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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8. I have drawn half of a function. Draw the other half to make it even or odd.

EVEN

ODD

9. Let function f be defined with the equation below.

$$f(x) \;=\; 9x - 5$$

a. Evaluate $f(8)$.

step 1: multiply by 9
step 2: subtract 5

$$f(8) \;=\; 9(8) - 5$$
$$f(8) \;=\; 67$$

b. Evaluate $f^{-1}(13)$.
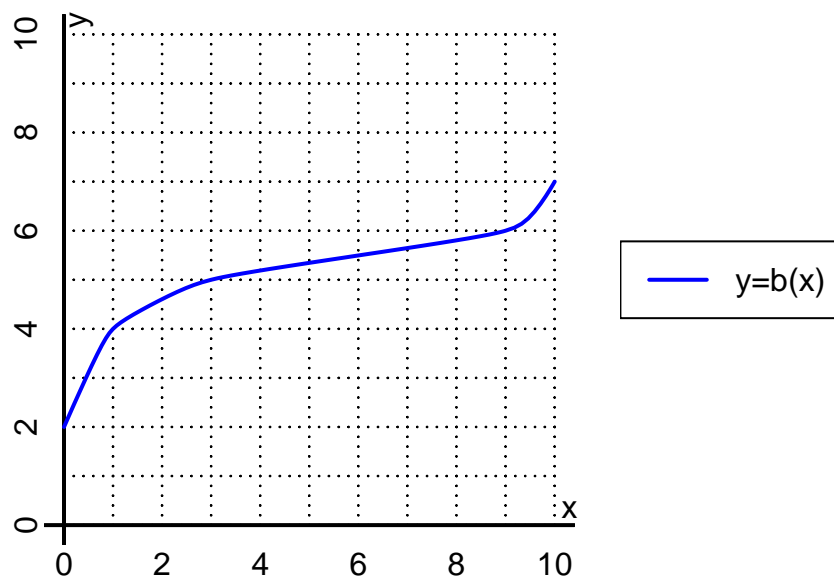
step 1: add 5
step 2: divide by 9

$$f^{-1}(x) \;=\; \frac{x+5}{9}$$
$$f^{-1}(13) \;=\; \frac{(13)+5}{9}$$
$$f^{-1}(13) \;=\; 2$$

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10. The function b is represented by the curve $y = b(x)$ graphed below.

a. Evaluate $b(3)$.

$$b(3) = 5$$

b. Evaluate $b^{-1}(4)$.

$$b^{-1}(4) = 1$$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	9	-9	9	-9
-1	5	-5	-5	5
0	0	0	0	0
1	-5	5	5	-5
2	9	-9	9	-9

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.